The American Fertilizer

92 JUNE 22, 1940 No. 13

Published every other Saturday. Annual subscription: In the United States, $3.00; Canada and Mexico, $4.00; other countries, $5.00. Entered as second-class matter, January 15, 1910, at the Post Office at Philadelphia, Pa., under Act of March 3, 1879. Registered in United States Patent Office. Publication office, 1330 Vine St., Phila., Pa.

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...THE...

AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

Vol. 92 JUNE 22, 1940 No. 13

The Industry and Preparedness*

By JOHN E. SANFORD

President, The National Fertilizer Association.

WHEN I spoke to you at the Atlanta convenution last fall, I talked of war between ourselves and war in Europe. We know from experience in our own industry that war is disastrous, usually resulting in defeat for all and victory for none.

The war in Europe has steadily reached out its tentacles and grasped more nations and more peoples, with enormous toll of property and lives. We are still determined to stay out of it.

Whoever may win, such a struggle is bound to have far-reaching effects on American business in general and on American agriculture and the fertilizer business in particular. Uncertainty as to duration of the war, the final outcome, peace terms, economic and trade policies that may be adopted, and other such matters, make it almost futile to try to forecast immediate effects in America. But the situation will require the sanest leadership both in Government and in business.

A condition that touches us even more closely is the possibility, even though it may be only a possibility, that our own country, despite our determinations, may itself become involved in a war, either in the immediate or in the more remote future. It has become evident that the isolation we formerly enjoyed does not now extend to us the same protection. Should so unfortunate a thing come to pass as that we should be engaged in any war, I am sure I voice the thought of every person and every element in the fertilizer industry when I say that every resource and every effort of the entire industry will go to the aid of our Government in the prosecution of such war. Likewise, I am sure I speak with your approval when I offer our industry's full and complete cooperation with the Government in the preparedness program now under way to serve as a preventive of war and, if need be, as defense against all enemies.

Fertilizer tonnage this year has probably been slightly above last year. Except for the peak year of 1937, the current year has been the best year, tonnagewise, since 1930. Favorable factors, such as increasing farm income and higher prices received by farmers, have been opposed by unfavorable factors, such as the cold wet spring and the sharp cut in tobacco acreage.

It is gratifying to the fertilizer industry to know that its product is one that serves its customer, the farmer, so well and at such moderate cost. The industry cooperates to its utmost with those scientists and State and Federal officials who are trying to acquire and disseminate information as to three important particulars, the right kind of fertilizer to be used, the right amount to be used, and the right way to use it. By so doing, the industry increases its usefulness and service, while intelligently advancing its own best interests.

One activity of this nature that has recently been emphasized by the Association and has met a splendid reception on all sides is the work on pasture fertilization. The calls for the special pasture fertilization issue of the "Review" were so numerous that 4,000 extra copies had to be run to meet the demand. The film "Green Acres" has been shown approximately 1,100 times to 80,000 persons. Another film, on the essential matter of fertilizer application, is now being prepared and will be completed in the fall.

I have said that the fertilizer industry sells its essential product at a moderate cost. That

* The Presidential Address before the National Fertilizer Association at White Sulphur Springs, June 4, 1940.

can be illustrated by reference to the so-called "parity price." "The farmer's goal of parity," according to a well-known farm leader, "is simply a price which will enable him to buy as much, in goods and services, as he could buy with the same commodities in the 1909-14 period." That condition exists with respect to fertilizer. According to the United States Department of Agriculture, prices received by farmers for their products in April and the prices they paid for fertilizer were each 98 per cent of the 1909-14 average. Prices they paid for all commodities were 123 per cent. These figures tell their own story, but you and I must see to it that they have the opportunity to do so.

In these few minutes I have touched only a few of the high spots in the year's doings. Intelligent self-interest suggests that we make our industry more and more useful, that we gear it more and more to public needs, that we fit it more and more harmoniously into the changing pattern of American life, and that we take the public more and more fully into our confidence so that the true story of our industry and its place in the life of our country may be known and understood.

REDUCED FREIGHT RATES TO CONTINUE

It has been announced that the reduced freight rates on fertilizers and fertilizer materials in 30-ton minimum carload lots in southeast territory have been extended to June 30, 1941. This reduction, which was to have expired June 30, 1940, proved profitable to both railroads and the fertilizer industry as it returned to rail shipment a substantial tonnage which had been handled by other methods of transportation.

APRIL SULPHATE OF AMMONIA

The U. S. Bureau of Mines reports that production of by-product sulphate of ammonia during April amounted to 54,570 tons, a decrease of 2.7 per cent from March production of 56,059 tons, but 37.5 per cent greater than April, 1939, when 39,635 tons were produced. For the first four months of 1940, the reoprt shows 224,496 tons, 29 per cent above the 173,841 tons for January-April, 1939.

By-product ammonia liquor was produced in an amount of 2,164 tons (NH_3 content), a slight decrease from the March figures of 2,252 tons, but well above April, 1939, which showed 1,783 tons. January-April production came to 9,086 tons; that of the same period of 1939 was 7,552 tons.

BORAX PRICES ISSUED

The American Potash & Chemical Corporation has issued their price schedule for borax and boric acid for the period from July 1, 1940, to December 31, 1940. The new schedule is the same as that which has been in effect during the first half of the year. The prices are as follows for the eastern and midwestern territory.

	Carloads Minimum 40 Tons	Ton Lots
Granular borax in bulk	$40.50	....
Granular borax in bags	43.00	$54.00
Powdered borax in bags	48.00	59.00
Granular boric acid in bulk	93.50	....
Granular boric acid in bags	96.00	108.00
Powdered boric acid in bags	101.00	113.00

Carload prices are f.o.b. plant at Trona, California, with freight allowed to destination. Any increases in current freight rates will be for buyer's account. L.C.L. prices are f.o.b. warehouse.

DR. SCHREINER APPOINTED ADVISOR ON SOILS

Dr. E. C. Auchter, Chief of the Bureau of Plant Industry, has announced that Dr. Oswald Schreiner will act as advisor to the Chief of the Bureau on soil problems connected with the work of the Bureau.

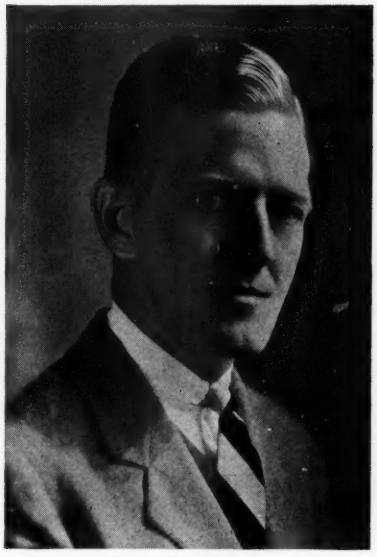
Doctor Schreiner was trained at the University of Maryland, Johns Hopkins University and the University of Wisconsin. He entered the Bureau of Soils of the Deartment of Agriculture in 1903. There he began studies on soil organic compounds and the effects of certain of these on plants. In 1906 he was placed in charge of soil fertility investigations in the Department. Here he directed and conducted research on soil fertility, biochemistry of soils and plants, soil solutions, analytical methods, nutritional deficiency diseases of plants and the allied items that enter into the broad field of soil productivity.

AAA SUPERPHOSPHATE BIDS

The bids for 150,000 tons of concentrated superphosphate which were invited by the AAA, for shipment during the fall of 1940 and the entire year of 1941, were opened on June 14th. The total of the bids presented came to 119,000 tons, with prices about the same as received in similar bids last year. Most companies bidding stipulated protection of prices against war emergencies.

Officers of the National Fertilizer Association 1940-1941

JOHN E. SANFORD
President, 1940-1941



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Re-elected to Board of Directors

LIONEL WEIL
Elected to Board of Directors

LOUIS WARE
Re-elected to Board of Directors

Some Problems Involved in Raising Farm Income

By J. W. TIDMORE

Head, Department of Agronomy and Soils, Alabama Agricultural Experiment Station, Auburn, Alabama.

IN this discussion it is assumed that the farmers of Alabama are typical of the farmers of the Cotton Belt, and that the conditions are similar to those in other southern states. This assumption may be a little out of line since the average income of the average Alabama farmer is almost at the bottom of the list of states on the basis of income per capita.

Alabama farmers received an average of approximately $200 cash income from cotton. Cash sales from all other sources, such as livestock and livestock products, peanuts, potatoes, fruits, grain, truck crops, etc., amounted to approximately $100 per farm. This makes a total cash sale per farm of about $300. The farm income in Alabama is next to the lowest of all the states in the Nation. It is hoped that the following discussion will aid in visualizing a program that will increase this income.

At the outset, it may be desirable to state some of the reasons for the extremely low incomes in the south. Simply to say "poor farming methods" will not wholly answer the question. The principal reasons are low yields per acre, one cash crop, tenant system, and credit system.

One of the most important problems confronting the farmers and other industries of the south is that of soil improvement. This is a true statement of the situation because the lands are poor, the yields obtained per acre are low, and, therefore the returns are small and the purchasing power of the farmer is low. The prosperity of most industries depends upon the financial condition of the farmers.

Must Increase Yields Per Acre

It is obvious that low crop yields per acre are closely associated with high cost of production. The cost of production of bales, pounds, or bushels has much to do with profits or losses in the farming industry. Therefore, with cheap cotton, it is possible for one farmer to make a profit on his cotton crop while his neighbor loses money because the former produced the cotton at a sufficiently low cost, while the latter did not. In the south or in any other section, a number of factors may influence the cost of production, but none of them is any more important than the yield per acre.

In Alabama, the average yields of corn and hay during the past 10 years were 13 bushels and .77 tons per acre, respectively; whereas, the yields of these crops in the Corn Belt States were about 35 bushels of corn and 1.2 tons of hay. The average cotton yield per acre in Alabama is around 250 pounds of lint, while it is 150 pounds in Texas and Oklahoma; but the farm family in Alabama produces about four bales while the average Texas farmer produces about eight bales. Therefore, the Alabama farmer *must* either increase the yield per acre in order to produce cotton at a lower cost per pound or be driven out of the business.

Some interesting figures on the cost of cotton production as related to yields are reported by Gist in Alabama Extension Service Circular 164. These figures are as follows:

Yield per Acre Lb. Lint	Cost of Production Cents
100	15.0
150	12.0
200	9.0
250	8.0
300	7.0
350	6.5
400	6.0
450	5.5
500	5.0
550	4.5
600	4.0

Last November at the annual meeting of the American Society of Agronomy, Director Funchess made some interesting comparisons of farm incomes of southern and Iowa farmers. He said: "The average cash return from all *crops* per capita from 10 southern states in 1937 amounted to $104. For Alabama this figure was $73, and for Iowa $77. The cash returns from all livestock and livestock products from the 10 southern states was $45, from Alabama $20, and from Iowa $469. Cash returns from all crops, from all livestock, and from Government payments for the 10 southern states was $158, for Alabama $100, and for Iowa $571. These very great differences in per capita in-

(Continued on page 22)

Consumption of Fertilizer Nitrogen in the United States

By F. W. PARKER

Ammonia Department, E. I. duPont de Nemours & Co., Inc., Wilmington, Delaware

STATISTICS on the consumption of fertilizer materials in the United States have been rather incomplete and unsatisfactory for many years. This situation is being corrected by studies of the Division of Fertilizer Investigations of the United States Department of Agriculture. Mehring* has published data on the consumption of fertilizer materials in the United States for the period 1850 to 1937. These data, with some additional data on the nitrogen content of organic materials also furnished by Mehring, are the basis for the material presented in this article. The data are expressed as short tons of nitrogen and include consumption in Hawaii and Pureto Rico as well as consumption in continental United States.

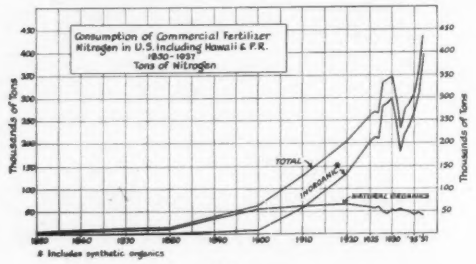

FIG. 1.

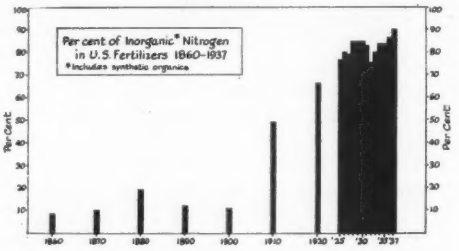

FIG. 2.

Total Nitrogen Consumption

The consumption of fertilizer nitrogen was very small and increased slowly from 1850 to 1880. Consumption then approximately doubled every ten years for the next three decades and reached 130,000 tons nitrogen in 1910. The increase continued to 202,000 tons in 1920, 347,000 tons in 1930, and 433,000 tons in 1937. There was, of course, a sharp drop in consumption during the depression with a low of 233,000 tons in 1932. These data, and the trend of consumption are clearly shown in Fig. 1.

Inorganic and Organic Nitrogen

In addition to giving the total consumption of nitrogen, Fig. 1 shows the consumption of organic and inorganic nitrogen. The latter includes synthetic organics such as cyanamide and urea. In 1900 inorganic sources of nitrogen were unimportant and furnished only 11 per cent of the nitrogen used in fertilizers. It was not until 1910 that consumption of inorganic nitrogen reached as high a level as the organics. Since 1910 the inorganics have furnished an increasingly higher percentage of the total nitrogen, as shown in Fig. 2. In 1937 approximately 90 per cent of the total nitrogen used in fertilizers was from inorganic and synthetic organic sources.

Fig. 1 shows that the maximum tonnage of organic nitrogen, 67,000 tons, was used in 1920. The tonnage has subsequently declined nearly 40 per cent to 50,000 tons in 1930 and approximately 41,000 tons in 1937. During the same 17-year period, the consumption of inorganic sources has gone from 134,000 tons to 392,000 tons, an increase of 190 per cent.

Forms of Organic Nitrogen

Utilizing Mehring's data, the sources of organic nitrogen used in fertilizers have been grouped into several classes shown in Fig. 3. The vegetable proteins include all oil seed meals and cocoa by-products. The animal proteins include dried blood, animal tankage and all fish products. The vegetable and animal protein materials were the only important source of organic nitrogen as late as 1920 when they furnished 88 per cent of the organic nitrogen. In 1930 and 1937 less than 60 per cent of the

* Mehring, A. L., "The Magnesium Content of Fertilizers, 1850-1937," 1939 Yearbook Commercial Fertilizer.

organic nitrogen was derived from materials classed as animal and vegetable proteins.

The production of process tankage started about 1910. After 1920 production increased rapidly to a total of 10,000 tons nitrogen in 1925. Production has remained at about that level, except during the depression years when it went as low as 3,400 tons nitrogen in 1932, but was back to nearly 10,000 tons nitrogen in 1937. In the latter year almost one-fourth of the organic nitrogen used for fertilizers was derived from process tankage. In that year it furnished almost as much nitrogen as did the animal or vegetable proteins.

The first indicated use of sewage sludge for fertilizers was in 1927. Consumption has increased from 1,100 tons nitrogen in that year to 4,400 tons nitrogen in 1937. In the latter year it furnished 10 per cent of the total organic nitrogen. This promises to be an increasingly important source of organic nitrogen, especially since Chicago has started large-scale production of sewage sludge.

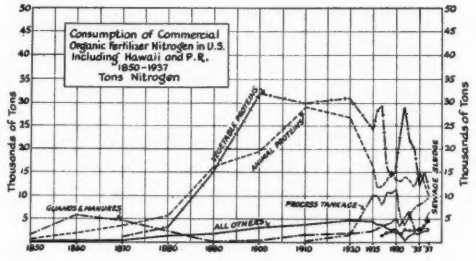

FIG. 3.

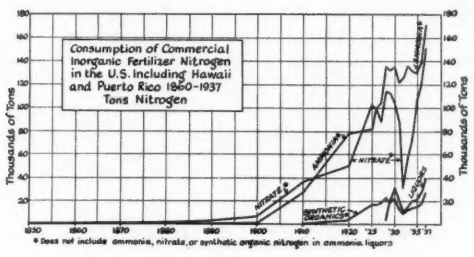

FIG. 4.

Forms of Inorganic Nitrogen

The inorganic nitrogen materials have been placed in four classes: (1) nitrates, including all solid nitrates; (2) ammonium salts, including the ammonium nitrogen in materials containing both ammonium and nitrate nitrogen; (3) synthetic organics, cyanamide and urea; (4) ammonia liquors, by-product and synthetic. The ammonia liquors contain ammonium, nitrate and urea nitrogen but it has seemed best to group them separately rather than break the tonnage down to the three major forms of soluble nitrogen. Well over half of the nitrogen in ammonia liquors, however, is in the ammonium form.

The consumption of the four forms or classes of soluble nitrogen is shown in Fig. 4. Sodium nitrate was the only important source of soluble nitrogen up to and including 1900. Beginning with 1910, ammonium salts became an important source of fertilizer nitrogen. Since 1910 the tonnage of nitrogen used as ammonium salts has nearly always exceeded the tonnage of nitrate nitrogen.

The consumption of synthetic organic nitrogen started about 1910 with the production of cyanamid and reached a tonnage of nearly 25,000 tons nitrogen in 1928 and 1930. Following a decrease during the depression, consumption reached a new high of 27,000 tons in 1937. This class of nitrogen materials may become more important with the recent domestic production of a urea-containing fertilizer material.**

Ammonia liquors for the ammoniation of superphosphate were first extensively used in 1928 but consumption increased to an estimated 31,000 tons in 1930. Consumption in 1937 was about 40,000 tons, approximately 10 per cent of the soluble nitrogen used in fertilizers. The ammonia liquors will probably be increasingly important sources of nitrogen although there are more limitations on the use of liquors than is the case with solid fertilizer materials.

Price of Nitrogen and Changes in Consumption

The indicated increase in consumption as well as shifts in forms of nitrogen are, in part, the result of changes in the cost of nitrogen. This subject cannot be adequately treated in this article. It is, however, of interest to note that the price of inorganic nitrogen dropped approximately 30 per cent in the period 1880 to 1925. Since 1925 there has been a further reduction of nearly 50 per cent in the wholesale price of inorganic and synthetic organic sources of nitrogen. These drastic price changes undoubtedly were a major factor in promoting the increased consumption of nitrogen fertilizers.

** "Uramon" fertilizer compound, 42% urea nitrogen, a product of the Ammonia Department, E. I. duPont de Nemours & Co.

THE AMERICAN FERTILIZER
ESTABLISHED 1894
PUBLISHED EVERY OTHER SATURDAY BY WARE BROS. COMPANY
1330 VINE STREET, PHILADELPHIA, PA.

A MAGAZINE INTERNATIONAL IN SCOPE AND CIRCULATION DEVOTED EXCLUSIVELY TO THE COMMERCIAL FERTILIZER INDUSTRY AND ITS ALLIED INDUSTRIES

PIONEER JOURNAL OF THE FERTILIZER INDUSTRY

WARE BROS. COMPANY
PUBLISHERS
1330 VINE STREET PHILADELPHIA, PA.
A. A. WARE, EDITOR

ANNUAL SUBSCRIPTION RATES

U. S. and its possessions, also Cuba and Panama.....$3.00
Canada and Mexico..... 4.00
Other Foreign Countries..... 5.00
Single Copy..... .25
Back Numbers..... .50

Vol. 92 JUNE 22, 1940 No. 13

Principal Articles in This Issue

The N. F. A. Golf Tournament

The golf events at the recent National Fertilizer Association Convention again proved to be the leading feature of the entertainment program. There were a goodly number of entrants and the varied list of events gave adequate scope for all levels of golfing skill.

The golf program was ably handled by the following committee: Albert B. Baker, Chairman; E. H. Jones, J. R. McCarty, John A. Miller, J. A. Monroe, A. L. Walker, Jr., T. S. Whitsel.

A total of 43 prizes were generously donated by the following:

The American Agricultural Chemical Co. (Rock Department), New York City.

American Cyanamid Co., New York City.

American Potash & Chemical Corporation, New York City.

The Barrett Company, New York City.

F. W. Berk & Co., Inc., New York City.

California Chemical Co., New York City.

Chilean Nitrate Sales Corporation, New York City.

E. I. duPont de Nemours & Co. (Ammonia Department), Wilmington, Del.

International Agricultural Corporation (Rock Department), New York City.

The Potash Company of America, Baltimore, Md.

Southern Phosphate Corporation, Baltimore, Md.

Texas Gulf Sulphur Company, New York City.

Union Special Machine Company, Chicago, Ill.

United States Potash Company, New York City.

The National Fertilizer Association.

The winners of the various contests were as follows:

MONDAY, JUNE 3RD

Medal Play Handicap

Winner—A. McLintock. *Runner-up*—A. H. Carpenter.

Match Play vs. Par

Winner—W. Crady. *Runner-up*—C. N. McNulty.

Tombstone Handicap

Winner—Geo. H. Heilig. *Runner-up*—M. H. Darden.

Kickers' Handicap

Winner—M. P. Sutherland. *Runner-up*—Geo. Suggs.

Veterans' Match Play vs. Par

Winner—W. B. Howe. *Runner-up*—J. T. Welch.

Low Gross

Winner—A. L. Walker. *Runner-up*—Weller Noble.

TUESDAY, JUNE 4TH

Medal Play Handicap

Winner—G. B. Cushman. *Runner-up*—S. Y. Priddy. *Third Prize*—W. A. Bridgers.

Match Play vs. Par

Winner—T. M. Murphy. *Runner-up*—J. R. Porter.

Tombstone Handicap

Winner—R. B. Douglass. *Runner-up*—W. A. Webster.

Kickers' Handicap

Winner—R. Grubb. *Runner-up*—Frank Totman.

Veterans' Medal Handicap

Winner—V. H. Kadish. *Runner-up*—Edward Ryland.

Low Gross

Winner—E. K. Ludington. *Runner-up*—H. R. Wemple.

WEDNESDAY, JUNE 5TH

Medal Play Handicap

Winner—J. R. McCarty. *Runner-up*—R. I. La Marche.

Match Play vs. Par

Winner—W. S. Rupp. *Runner-up*—Harry Kemp.

Tombstone Handicap

Winner—C. C. Concannon. *Runner-up*—M. H. McCord.

Kickers' Handicap

Winner—J. P. Brinton. *Runner-up*—R. H. Groebe.

Low Gross

Winner—J. C. Fulton. *Runner-up*—W. Logan.

JUNE 3RD, 4TH AND 5TH

Championship (Ringer Handicap)

Winner—T. M. Murphy. *Runner-up*—W. Crady.

LADIES' EVENTS—TUESDAY, JUNE 4TH

Ladies' Putting Conest (For Golfers)

Winner—Miss Peggy Jordan. *Runner-up*—Mrs. Walter Crady.

Ladies' Putting Contest (For Non-Golfers)

Winner—Mrs. H. M. Albright. *Runner-up*—Mrs. E. C. Adams.

Ladies' Kickers Medal Handicap

Winner—Mrs. W. Logan. *Runner-up*—Mrs. J. T. Phillips.

AGRICULTURAL SULPHUR BOOKLET

A new booklet, "The Use of Sulphur in Soils," has been published by the Texas Gulf Sulphur Co. This 96-page pamphlet contains a valuable summary of the various agricultural uses of sulphur. Starting with the history of sulphur and its occurrence in nature, it treats of such subjects as the sulphur contents of crops, the chemical effects of sulphur in soils, time, method and rate of application. Other chapters cover the use of sulphur in reclamation of alkali soils, the use of sulphur in the acidulation of fertilizers and in composting organic matter. The final section contains abstracts of about 90 articles on the subjects covered in the booklet. It is fully illustrated with views of demonstration results.

The Texas Gulf Sulphur Co. has also published a pamphlet on "Rose Diseases." which covers the various ailments to which this plant is subject, and the methods of treatment to overcome the disease. Copies of both booklets will be sent upon request to the agricultural department of the company, 1103 Second National Bank Building, Houston, Texas.

FARMERS INCREASE USE OF LIME UNDER GRANT-OF-AID PROGRAM

Farmers already have obtained 2½ times as much lime under the 1940 grant-of-aid program as they requested during the entire 1939 season, the Agricultural Adjustment Administration reported on June 14th. The present program still has several months to run in most states.

For the first five months of this year, the AAA distributed 1,677,609 tons of liming materials, as compared with 660 610 tons during 1939. Farmers have also received so far this year 115,049 tons of concentrated (45 to 48 per cent) superphosphate and 33,639 tons of 20 per cent superphosphate.

SOUTHWEST FERTILIZER MANUFACTURERS TO MEET IN JULY

Dr. G. S. Fraps, State Chemist, has announced that the sixteenth annual meeting of fertilizer manufacturers doing business in Texas and the eighth joint annual meeting of manufacturers and fertilizer control officials of Louisiana, Texas, Arkansas, and probably Oklahoma, will be held at the Washington-Youree Hotel, Shreveport, La., on July 18th. The meeting will start at 10 A. M. and will act on recommendations for fertilizer grades to be adopted as official, for sale in those states during the 1940-1941 fertilizer season.

AMERICAN POTASH AND CHEMICAL CORP. ISSUES PRICE SCHEDULE

On June 19th, the American Potash & Chemical Corporation announced their schedule of prices for the 1940-1941 season. The price for muriate of potash, in bulk, ex-vessel principal continental U. S. ports is the same as during the previous season, 53½ cents per unit of K_2O. For delivery f.o.b. cars at Trona, California, the price is 8 cents per unit below the net ex-vessel price at Pacific Coast ports. For shipment in 200 lb. bags, an additional charge of $2.00 per ton is made.

The company is also offering sulphate of potash at $36.25 per ton in 200 lb. bags, basis 90% K_2SO_4, ex-vessel principal continental U. S. ports. A reduction of $2.00 per ton is allowed for shipment in bulk, but regulations require that water shipments be made in bags.

A seasonal discount of 8 per cent from the list prices is allowed on orders accepted prior to July 26, 1940, for delivery in June or July or for delivery in substantially equal monthly quantities from August 1, 1940, to January 31, 1941. Upon completion of the contract according to the specified terms, an additional 4 per cent discount is allowed.

On orders placed before November 1, 1940, for delivery in monthly shipments by January 31, 1940, a discount of 4 per cent is allowed; with an additional 2 per cent upon completion of the contract.

The prices are guaranteed against a general reduction in the price schedule until June 1, 1941, except where the reduction is the result of governmental action.

PRICES FOR FRENCH POTASH

The French Potash & Import Co., New York City, has announced that orders for muriate of potash will be accepted at the current price of 53½ cents per unit K_2O, in bulk, basis ex-vessel. Atlantic and Gulf ports. For seasonal orders with regular monthly deliveries to January 31, 1941, a discount of 12 per cent is allowed on orders placed prior to July 26, 1940, and a discount of 6 per cent on orders placed prior to November 1, 1940.

While shipments from abroad have been halted by war conditions in Europe, stocks of muriate of potash in this country enable the company to take orders on the above terms.

SOIL TEST INTERPRETATION

In discussing soil testing at the Southern New England Fertilizer Conference at Amherst, Mass., Director Sievers had this to say, "Because a person has sufficient technical skill to operate the test, this does not necessarily qualify him to interpret it and to make fertilizer recommendations." Dr. M. F. Morgan, one of the pioneers in this field, said, "In my opinion no one should attempt to recommend fertilizer practices based on soil tests until he or she has made at least 500 such tests." The consensus of opinion, briefly, was that too many people were strong on technique but weak on interpretation.

FERTILIZER MATERIALS MARKET

NEW YORK

New Prices Announced on Some Important Materials. Markets More Active with Bookings for Coming Season.

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, June 18, 1940.

As a result of the announcement of some new-seasonal prices on basic fertilizer materials, the market in general is considerably more active than was the case two weeks ago. Of course, the full impetus of buying for the coming season has not been felt as yet, but a number of fertilizer manufacturers have already booked a portion of their requirements in various materials. Although no new prices have been announced as yet on the chemical nitrogen-bearing fertilizers, two of the major potash producing companies and most of the producers of phosphoric acid have published their new schedules during the past week or so. It is interesting to note, at this time, that price schedules on potash salts, as announced by two producers, are, in effect, the same as has been the case in the past. In spite of the fact that there will probably be no more potash shipments from abroad for the duration of the war, no shortage in this commodity is anticipated, as domestic producers are prepared to meet the demand, at least for muriate.

There is still call in the export market for various materials and a small amount of this business has been done during the past two weeks.

Nitrate of Soda

With no new prices announced as yet, old schedule still prevails at $27.00 per ton, bulk; $28.30 in 200-lb. bags, and $29.00 in 100-lb. bags; port basis. Stocks remain ample with no interruption of shipments anticipated.

Sulphate of Ammonia

It is generally anticipated that the present price of $28.00 per ton in bulk, port basis, will be continued throughout the summer months, and the trade is now awaiting some announcement to this effect.

Superphosphate

Ordinary superphosphate is very strong at 52½ cents per unit in bulk, New York. Some export business has been done at $14.00 to $14.50 in bags, f.a.s. New York. Triple superphosphate for July/December shipment has been increased 2 cents per unit over the previous price. Because of the uncertainty in oil and other production costs, prices have only been announced on triple superphosphate as far as December.

Potash

The new basis now in effect is as follows: muriate of potash, 53½ cents per unit K_2O, basis ex vessel ports, in bulk; or 42.3 cents per unit K_2O, f.o.b. cars Carlsbad, in bulk. These prices are of course subject to the regular contract discount. Due to the small production of sulphate of potash in this country, there is the likelihood of a shortage in this material; and this will certainly be the case with sulphate of potash magnesia, as we have no domestic production at all.

Dried Blood

This market is somewhat weaker. Domestic material is offered on the basis of $2.35 per unit of ammonia ($2.85½ per unit N), f.o.b. New York. South American blood meal can be bought at around $2.40 per unit of ammonia ($2.91½ per unit N), c.i.f. Atlantic ports, for nearby shipment.

Tankage

Domestic offerings are scarce and buying interest is very limited, but local New York 8/9 per cent unground material has been quoted recently at $2.35 ($2.85½ per unit N) and 10 cents. New England productions are offered at $2.25 ($2.73½ per unit N) and 10 cents for 11/12 per cent unground material. There have been no recent foreign offerings, but it is felt a bid of from $2.65 to $2.75 ($3.22 to $3.34½ per unit N) and 10 cents would be acceptable.

Nitrogenous Material

Unchanged, with quotations still made port basis and suppliers apparently well sold up.

Fish Scrap

The last sale of menhaden scrap was made at $3.50 ($4.25½ per uit N) and 10 cents. Menhaden meal, old crop, is quoted at $58.00, Baltimore, with supplies scarce. New-crop menhaden meal is listed at $51.00, Baltimore basis. Some resales have been reported on Japanese sardine meal at $53.50, but no new-seasonal offerings are to be noted.

Bone Meal

South American raw bone 4½ and 50 per cent is still being quoted at $31.50, c.i.f. for June/July shipment, and there is no change in the South American 3 and 50 per cent steamed bone meal at this time. Supplies of this material which have been coming from Europe through Italy have now been completely stopped, due to the entrance of that country into the war.

BALTIMORE

Late Shipments Bring Season's Tonnage to Normal. Some Interest Shown in Supplies for Fall Mixing.

Exclusive Correspondence to "The American Fertilizer."

BALTIMORE, June 18, 1940.

Late shipments of complete fertilizer help bring up the tonnage very close to volume of last year, and therefore stocks being carried over are at a minimum. More interest is now being shown in supplies of materials for the fall season, but on account of war conditions there has been less interest than would otherwise be shown at this time of the year.

Ammoniates.—South American ammoniates are still having their effect on the domestic market, and tankage suitable for feeding purposes is selling at about $2.75 per unit of nitrogen and 10 cents per unit of B.P.L., f.o.b. basis Baltimore. South American ground dried blood is now quoted at the equivalent of $2.80 per unit of nitrogen, c.i.f. Baltimore.

Nitrogenous Material.—There is very little interest being shown in this commodity, and the nominal market is around $2.65 per unit of nitrogen for domestic material.

Sulphate of Ammonia.—Business in this commodity is practically over, but mills are still considerably behind in their shipping schedule. New prices are expected at almost any time, and it would not be surprising to see higher market, but there has been no indication of just what the new price will be. Re-sale is still nominally quoted at $33.00 per ton, in bulk, f.o.b. Baltimore.

Nitrate of Soda.—Orders are still being received for top-dressing purposes, and the present price of $29.00 per ton of 2,000 lb., in 100-lb. bags will apply over the balance of this month.

Fish Scrap.—There is less interest shown in this material than for some time past on account of price being out of range with other feeding materials. Last sales were on the basis of $4.25 per unit of nitrogen, and 10 cents per unit of B.P.L., f.o.b. fish factories, subject to catch, and for shipment if and when made. Japanese sardine meal as well as 55 per cent menhaden fish meal are still being quoted at $58.00 per ton of 2,000 lb., f.o.b. Baltimore, but with only a limited demand.

Superphosphate.—Manufacturers have not made any changes in their prices, and the market continues firm at $8.50 per ton of 2,000 lb., basis 16 per cent for run-of-pile and $9.00 for flat 16 per cent grade, both in bulk, f.o.b. Baltimore.

Bone Meal.—On account of comparative high prices prevailing on bone products, the demand is less than usual. 3 and 50 per cent domestic steamed bone meal ranges from $32.00 to $34.00 per ton, with 4½ and 50 per cent

South American raw bone meal being obtainable at $31.00 to $32.00 per ton, c.i.f. Baltimore.

Bags.—The market on burlap has again eased off, and the prevailing price for delivery over balance of this year is about $114.00 per thousand for 10 oz. basis 40 cut 54 in., plain, for fall delivery.

PHILADELPHIA

Absence of Activity in Materials Market. New Schedule of Prices Awaited.

Exclusive Correspondence to "The American Fertilizer."

PHILADELPHIA, June 18, 1940.

There is practically no activity in the fertilizer materials market. Deliveries on nitrate of soda contracts continue fair, but very little of other materials is moving.

Nitrate of Soda.—Price remains the same. Deliveries fair.

Sulphate of Ammonia.—Slow. Price remains fairly steady.

Dried Blood.—No interest being shown by buyers. Nominal price, $2.30 to $2.35 per unit of ammonia ($2.79½ to $2.85½ per unit N).

Tankage.—Demand light. Nominal price about $2.30 ($2.79½ per unit N) and 10 cents.

Bone Meal.—Prices firm. Deliveries fair. 1 and 65% about $35.00; 3 and 50% at $33.00; 4½ and 45% about $35.00.

Superphosphate.—Demand light. Buyers awaiting new schedules.

Potash.—Syndicate schedule prevails.

OWENS APPOINTED ROYSTER MANAGER

W. T. Wright, vice-president of F. S. Royster Guano Co., has announced the appointment of E. P. Owens as manager of the company's Atlantic office, succeeding J. E. Barnes.

CHICAGO

Fertilizer Organics Market Dull, Probably Throughout Summer. Feed Prices Reduced.

Exclusive Correspondence to "The American Fertilizer."

CHICAGO, June 17, 1940.

The market for organics remains dull, and not quite steady in tone. Inquiry, however, is no more broad than it was earlier this month, and it would appear this condition will continue at least during the first part of summer. Reports indicated no business of consequence occured during the Convention, at White Sulphur.

The lists of feed prices were again reduced, this time to $40.00 per ton, and even that price is reported as not being maintained. This naturally causes a further easiness in the materials markets.

Nominal prices are as follows: High grade ground fertilizer tankage, $2.15 to $2.25 ($2.61½ to $2.73½ per unit N) and 10 cents; standard grades crushed feeding tankage, $2.00 to $2.10 ($2.43 to $2.55½ per unit N) and 10 cents; blood, $2.00 to $2.10 ($2.43 to $2.55½ per unit N); dry rendered tankage, 47 to 52 cents per unit of protein, Chicago basis.

TENNESSEE PHOSPHATE

Weather Favors Both Mining Operations and Agriculture. Flotation Process Used in Some Plants.

Exclusive Correspondence to "The American Fertilizer."

COLUMBIA, TENN., June 17, 1940.

The weather for the most part has been extremely favorable for several weeks for both phosphate mining and construction operations and for farmers, the two main industries upon which this section depends for a living.

All the rye and barley and much of the wheat and oats are cut and most of the tobacco is set out, with prospects for fair yields in all lines mentioned.

SUNSHINE STATE POTASH

A PRODUCT OF NEW MEXICO SERVES THE NATION

The Old Zia Indian sun symbol of New Mexico has been adopted as the trademark of the United States Potash Company. This interesting symbol serves to emphasize the Indian background of New Mexico's history.

SUNSHINE STATE POTASH
A PRODUCT OF NEW MEXICO U.S.A.

Trademark Reg. U. S. Pat. Off.

GOOD fertilizer is just as essential to a good crop as rain and sunshine. Plenty of the right fertilizer—containing along with other essential plant foods, the proper potash content—makes for higher yields per acre and better quality.

Every year, thousands of tons of Sunshine State Potash go to enrich the soil in all sections of the country. The year 1940 finds Sunshine State Potash highly regarded by all fertilizer producers. They recognize the consistently uniform analysis of its Muriate of Potash and Manure Salts, and the careful sizing that makes handling and blending easy.

HIGRADE MURIATE OF POTASH

62/63% K_2O

ALSO 50% K_2O GRADE

•

MANURE SALTS

APPROXIMATELY 30% K_2O

UNITED STATES POTASH COMPANY, Incorporated, 30 Rockefeller Plaza, New York, N. Y.

Much construction has been under way and the plants of the Hoover & Mason Phosphate Co., the Charleston Mining Co., and the Federal Chemical Co., have all been put in first class operating shape for the heavy business anticipated during the August/November active shipping season.

Trucks play a continually increasing part in the transportation of both raw material within the mining and processing area as well as in that of the finished product for fertilizer use, the volume of the latter for transportation to the farmer having increased more than tenfold in four years.

The flotation process in use by the International Agricultural Corp., Charleston Mining Co., and Armour Fertilizer Works, under the patents of the Phosphate Recovery Corp., enable all these companies to greatly extend the life of their operations, by using much lower grade deposits than could formerly be worked, so long as they can market the low grade by-product, formerly wasted, for filler in the fertilizer factories, and for sale to farmers for direct application to the soil, which latter use is rapidly increasing.

The Hoover & Mason Phosphate Co., having higher grade deposits, are still producing a single high grade product, most of which is sold to fertilizer manufacturers who do not have mines of their own and to TVA, and the same high grade is marketed direct to the farmer trade through the Ruhm Phosphate & Chemical Co., which has been continuously in that business since 1897.

Large shipments continue to the TVA at Muscle Shoals, both from the hand mines in the Bear Creek area, from Gallatin, and also washed rock from large producers at Mt. Pleasant and Wales and sintered product from Monsanto.

Kentucky was again the banner state in orders for TVA and other superphosphate, both in TVA demonstrations that superphosphate and enough limestone will grow good crops, and for AAA grants in aid in the AAA benefit payment program. Reports indicate that the TVA experimental operations will show a larger volume in 1940 even than the peak reached in 1939, when about 68,000 tons of treble super and 4,000 tons of metaphosphate were experimentally produced, with a few hundred tons of fused phosphate rock, in the production of which about 150,000 tons of phosphate rock equivalent would be used.

SOME PROBLEMS INVOLVED IN RAISING FARM INCOME

(Continued from page 9)

come may be readily understood from the following figures.

"The number of acres of farm land per capita in the 10 southern states was 24, while in Alabama it was 14, and in Iowa it was 35. The number of acres of harvested crops for the 10 cotton-producing states was 7, for Alabama it was 5, while for Iowa it was 20. In 1937, Alabama farmers planted 3,493,000 acres of corn that produced an average of 14 bushels per acre, or a total of approximately 49,000,000 bushels of corn. The same year, Iowa farmers planted 9,636,000 acres of corn with an average yield of 45 bushels per acre and a total production of 438,438,000 bushels. The Iowa farmer planted nearly three times as many acres of corn, but produced nearly ten times as many bushels as the Alabama farmer secured for his effort. Alabama farmers had 132,000 acres of oats that produced an average of 24 bushels per acre and a total crops of 3,168,000 bushels. The Iowa farmers planted nearly 6,000,000 acres in oats, produced an average yield of 33 bushels an acre, and harvested 198,000,000 bushels of oats."

WELLER NOBLE
Re-elected to N.F.A. Board of Directors

To illustrate further the importance of the yield of crops per acre as affecting the farmer's income with the present acre yields of the various crops, it is impossible for the average two-mule farmer to plant and cultivate enough land, provided it was available, to produce the necessary food, feed, and cash crops to feed his family and livestock and to supply sufficient cash for the things which are ordinarily considered essential. For example, this farmer would need approximately 65 acres of crop and pasture land to supply the needs of the farm and give him sufficient cash for the things that he needs or to make a payment on a debt. One farm family, with two mules and the present methods, cannot operate 65 acres of land even if they had it.

The desirability of increasing the crop yields per acre is evident; and logically the question is, how may this be done economically? Crop yields may be increased by larger applications of commercial fertilizers or by growing crops after certain legumes which are properly fertilized. In this area, the yield of cotton and corn may be at least doubled and possibly trebled through the application of adequate amounts of nitrogen plus only moderate amounts of mineral fertilizers. Data obtained

on typical Cotton Belt soils by the experiment stations of the area indicate that yields of corn and oats may be maintained on higher levels than those obtained on typical Corn Belt soils if large amounts of nitrogen are supplied. A few examples of possible yields per acre follow.

Cotton.

The farmer usually applies around 300 pounds of fertilizer per acre. During the past five years, the Alabama Station has conducted experiments at eight places in the state in which the efficiency of 300 and 600 pounds per acre of a 6-8-4 fertilizer was compared. The average yield of 40 crops has been as follows:

	Seed Cotton per Acre
No fertilizer	558 lb.
600 lb. 6-8-4	1,177
300 lb. 6-8-4	942
Difference	235 lb.

The difference of 235 pounds at 3 cents per pound is worth $7.05. This difference is more than eough to pay for the *600-pound application.* Stating it another way, the increased cotton was produced at a fertilizer cost of 4.2 cents per pound of lint. Hundreds of similar tests have been conducted on farmer's land during the past 25 years and the average increased yield for the second 300 pounds of fertilizer has been about 200 pounds of seed cotton per acre.

Winter legumes properly fertilized have increased cotton yields as much as or more than 36 pounds of nitrogen per acre. On cotton land the farmer can and should produce at least ¾ of a bale of cotton per acre if he expects to make a living by the production of cotton. Many fields, extremely sandy in nature, will not do this—then I would say that these fields should be used for some other crops.

Corn.

As stated above, the corn yield is extremely low in the Cotton Belt. In Alabama, this yield is 12 or 13 bushels. Thus the corn is very expensive per bushel. During the past 11 years the Alabama Station has conducted experiments on eight different soil types using various grades of fertilizer for corn at the rate of 600 pounds per acre. The results are as follows:

	Yield Bus.	Increase Bus.	Fertilizer Cost of Increased Bushels Cents
0-10-4	13.8	..	...
2-10-4	21.3	7.5	17.6
4-10-4	28.6	7.3	18.1
6-10-4	33.9	5.3	25.0
6-0-0*	33.2	4.6	29.0

* Compared with the 4-10-4 plot.

These results show that the increased corn yield may be produced for less than 25 cents per bushel. The average farmer does not use over 12 pounds of nitrogen for corn. The difference between the efficiency of 12 and 36 pounds of nitrogen is about 12.6 bushels for a cost of approximately $2.50.

In a two-year rotation of cotton and corn at three substations, vetch preceding the corn has increased the corn yield during the past 10 years an average of 25.7 bushels. This is mighty cheap corn.

Hay.

The average hay yield in the south is very low, approximately ¾ ton per acre. Most of the hay produced is from annual plants, such as cowpeas, soybeans, and annual lespedeza. These types of hay are too expensive for livestock production. Sufficient data are available from experiment stations to show that perennial hays, such as kudzu, lespedeza sericea, and alfalfa on some soils will greatly outyield annual hay crops and at a much less cost per ton. Two or three tons of hay may be produced per acre.

Oats.

Probably Alabama is not a typical southern state with respect to oats. In the first place, a relatively small acreage of oats is planted and our average yield per acre is low. On a very poor sandy soil, the Alabama Station reports an increase of 10 bushels of oats for each 16 pounds of nitrogen up to 48 pounds. This means fertilizer cost of about 17 cents per bushel. In addition to a cheap feed crop, oats will play an important part in soil erosion control during the winter and early spring months.

It is probable that most of the farmers could not do in a short time many of the things de-

scribed above for increasing crop yields per acre. Some are able to do them in a very few years, while a number of years would be required by others. However long it may take, this is the route which must be followed.

Put More Acres to Work

Under the present program, most of the farmers are attempting to make less than approximately one-third of their cultivated land (that which is in cotton) pay *all of their expenses,* and this fraction of the farm will not do this. Under the present conditions, the other two-thirds of the farm land returns to the farmer very little for the effort that is put on it. The problem is to make this part of the farm carry a reasonable share of the burden of producing income. In Alabama, a good income cannot be had by more than 250,000 farmers as long as they divide among themselves the proceeds from 1,000,000 bales of cotton as their chief source of cash, while more than two-thirds of this land returns them so little.

For Home Needs

In order to produce food and feed crops in adequate quantities for the needs of Alabama, it has been estimated by F. W. Gist that the following increases in production should be made:

	Produces	Ought to Produce	Increase %
Meat	263,000,000 lb.	397,000,000	140
Milk	134,424,000 gal.	250,000,000	186
Eggs	28,170,000 doz.	65,000,000	231
Corn	41,000,000 bus.	90,000,000	219
Oats	1,900,000 bus.	20,000,000	1,052
Hay	600,000 tons	1,800,000	300
Peanuts	9,000,000 bus.	12,000,000	133
Soybeans	132,000 bus.	500,000	379
Cowpeas	1,143,000 bus.	2,000,000	175
Syrup	6,000,000 gal.	5,000,000	83
Potatoes	2,800,000 bus.	5,000,000	179
Sweet potatoes	6,100,000 bus.	8,000,000	131

From the above figures, it is obvious that there is a great need for more acres in these crops along with an increased production per acre.

For Sale

It seems that the most practical plan for increasing farm income can be provided through diversification, which calls for the production of food, feed, and forage crops. These crops cannot be sold as crops to any appreciable extent. They must be sold through livestock and livestock products. However, the production of adequate and cheap feed is the starting point. The south will never produce very much livestock and livestock products until the acre yields of pastures and feed crops are increased. The farmers' income can be practically doubled by producing all of the cotton possible on a *limited* acreage and using the other acres for the production of feed crops for livestock.

In order to show exactly how farm incomes may be increased by making land, other than cotton land, contribute to the farm income, Director Funchess has outlined excellent procedures in Special Leaflets entitled, "The Problem of Low Farm Income," No. 1 and No. 2. In No. 1 corn is used as a feed for hogs, and in No. 2 peanuts are the basis of the hog production program. These leaflets will be reviewed here with the belief that you will be interested in them. In the first instance, "DeKalb County, Alabama, was selected as the area on which to base the first example because of the fact that the work on the Sand Mountain Station has proved through several different types of experiments that good yields of corn may be made with fertilizer or by the use of soil-building crops. The potential results shown for this county will apply in the upper part of the state where a hog program should probably be based on corn.

(To be concluded in the next issue.)

BUYERS' GUIDE

A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

This list contains representative concerns in the Commercial Fertilizer Industry, Including fertilizer manufacturers, machinery and equipment manufacturers, dealers in and manufacturers of commercial fertilizer materials and supplies, brokers, chemists, etc.
For Alphabetical List of Advertisers, see page 33.

ACID BRICK
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

ACID EGGS
Chemical Construction Corp., New York City.

ACIDULATING UNITS
Chemical Construction Corp., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMO-PHOS
American Cyanamid Co., New York City.

AMMONIA—Anhydrous
Barrett Company, The, New York City.
Du Pont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA LIQUOR
Barrett Company, The, New York City.
Du Pont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA OXIDATION UNITS
Chemical Construction Corp., New York City.

AMMONIATING EQUIPMENT
Sackett & Sons Co., The A. J., Baltimore, Md.

APPARATUS—Laboratory
Sturtevant Mill Co., Boston, Mass.

AUTOMATIC ELEVATOR TAKEUPS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

BABBITT
Sackett & Sons Co., The A. J., Baltimore, Md.

BAGS AND BAGGING—Manufacturers
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.
Fulton Bag & Cotton Mills, Atlanta, Ga.

BAGS—Cotton
Bemis Bro. Bag Co., St. Louis, Mo.
Fulton Bag & Cotton Mills, Atlanta, Ga.

BAGS—Paper
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS (Waterproof)—Manufacturers
Bemis Bro. Bag Co., St. Louis, Mo.
Fulton Bag & Cotton Mills, Atlanta, Ga.

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

BAGGING MACHINES—For Filling Sacks
Atlanta Utility Works, East Point, Ga.
Bagpak, Inc., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.
Sturtevant Mill Co., Boston, Mass.

BAG-CLOSING MACHINES
Bagpak, Inc., New York City.

BAG PILERS
Link-Belt Company, Philadelphia, Chicago.

BEARINGS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

BELT LACING
Sackett & Sons Co., The A. J., Baltimore, Md.

BELTING—Chain
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

BELTING—Leather, Rubber, Canvas
Sackett & Sons Co., The A. J., Baltimore, Md.
Sturtevant Mill Co., Boston, Mass.

BOILERS—Steam
Atlanta Utility Works, East Point, Ga.

BONE BLACK
American Agricultural Chemical Co., New York City.
Armour Fertilizer Work, Atlanta, Ga.
Huber & Company, New York City.

BONE PRODUCTS
American Agricultural Chemical Co., New York City.
Armour Fertilizer Work, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BORAX AND BORIC ACID
American Potash and Chem. Corp., New York City.
Pacific Coast Borax Co., New York City.

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Burns & Company, L. D., Atlanta, Ga.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Keim, Samuel L., Philadelphia, Pa.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

BUCKETS—Elevator
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

A Classified Index to Advertisers in "The American Fertilizer"

BUYERS' GUIDE

For an Alphabetical List of all the Advertisers, see page 33

BUCKETS—For Hoists, Cranes, etc., Clam Shell, Orange Peel, Drag line, Special; Electrically Operated and Multi Power
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

BURNERS—Sulphur
Chemical Construction Corp., New York City.

BURNERS—Oil
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.

CABLEWAYS
Hayward Company, The, New York City.

CALCIUM-NITRATE
Synthetic Nitrogen Products Co., New York City.

CAL-NITRO
Synthetic Nitrogen Products Co., New York City.

CARBONATE OF AMMONIA
American Agricultural Chemical Co., New York City.
Du Pont de Nemours & Co., E. I., Wilmington, Del.

CARS—For Moving Materials
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CARTS—Fertilizer, Standard and Roller Bearing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

CASTINGS—Acid Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

CASTINGS—Iron and Steel
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CEMENT—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

CHAIN DRIVES—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAINS AND SPROCKETS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAMBERS—Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CHEMICAL APPARATUS
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

CHEMICALS
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Company, The, New York City.
Bradley & Baker, New York City.
Du Pont de Nemours & Co., E. I., Wilmington, Del.

CHEMICALS—Continued
Huber & Company, New York City.
Wellmann, William E., Baltimore, Md.

CHEMICAL PLANT CONSTRUCTION
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

CHEMISTS AND ASSAYERS
Gascoyne & Co., Baltimore, Md.
Shuey & Co., Savannah, Ga.
Stillwell & Gladding, New York City.
Wiley & Company, Baltimore, Md.

CLUTCHES
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CONCENTRATORS—Sulphuric Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CONDITIONERS AND FILLERS
American Limestone Co., Knoxville, Tenn.

CONTACT ACID PLANTS
Chemical Construction Corp., New York City.

COPPER SULPHATE
Tennessee Corporation, Atlanta, Ga.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

CRANES AND DERRICKS
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corp., Chicago, Ill. and Cedar Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

CYANAMID
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Jett, Joseph C., Norfolk, Va.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

DENS—Superphosphate
Chemical Construction Corp., New York City.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

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DISINTEGRATORS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DOUBLE SUPERPHOSPHATE (See Superphosphate—Concentrated)

DRYERS—Direct Heat
Sackett & Sons Co., The A. J., Baltimore, Md.

DRIVES—Electric
Link-Belt Company, Philadelphia, Chicago.

DUMP CARS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DUST COLLECTING SYSTEMS
Sackett & Sons Co., The A. J., Baltimore, Md.
Sturtevant Mill Co., Boston, Mass.

ELECTRIC MOTORS AND APPLIANCES
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

ELEVATORS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ELEVATORS AND CONVEYORS—Portable
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Sturtevant Mill Co., Boston, Mass.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

ENGINES—Steam
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

EXCAVATORS AND DREDGES—Drag Line and Cableway
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corp., Chicago, Ill. and Cedar Rapids, Iowa.

FERTILIZER MANUFACTURERS
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Farmers Fertilizer Co., Columbus, Ohio.
International Agricultural Corp., New York City.
Smith-Rowland Co., Norfolk, Va.
U. S. Phosphoric Products Corp., New York City.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

FOUNDERS AND MACHINISTS
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Link-Belt Company, Philadelphia, Chicago.

FOUNDERS AND MACHINISTS—Continued
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GARBAGE TANKAGE
Wellmann, William E., Baltimore, Md.

GEARS—Machine Moulded and Cut
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GEARS—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

GELATINE AND GLUE
American Agricultural Chemical Co., New York City.

GUANO
Baker & Bro., H. J., New York City.

HOISTS—Electric, Floor and Cage Operated, Portable
Hayward Company, The, New York City.

HOPPERS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

IRON SULPHATE
Tennessee Corporation, Atlanta, Ga.

INSECTICIDES
American Agricultural Chemical Co., New York City.

LACING—Belt
Sackett & Sons Co., The A. J., Baltimore, Md.

LIMESTONE
American Agricultural Chemical Co., New York City.
American Limestone Co., Knoxville, Tenn.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

LOADERS—Car and Wagon, for Fertilizers
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Coal and Ash Handling
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Elevating and Conveying
Atlanta Utility Works, East Point, Ga.
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
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Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Power Transmission
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Pumping
Atlanta Utility Works, East Point, Ga.

MACHINERY—Tankage and Fish Scrap
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MAGNESIA
California Chemical Co., New York City.

MAGNETS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MANGANESE SULPHATE AND CARBONATE
Tennessee Corporation, Atlanta, Ga.

MANGANESE SULPHATE
Tennessee Corportion, Atlanta, Ga.

MIXERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

NITRATE OF SODA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Company, The, New York City.
Bradley & Baker, New York City.
Chilean Nitrate Sales Corp., New York City.
Huber & Company, New York City.
International Agricultural Corp., New York City.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

NITRATE OVENS AND APPARATUS
Chemical Construction Corp., New York City.

NITROGENOUS ORGANIC MATERIAL
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Du Pont de Nemours & Co., E. I., Wilmington, Del.
Huber & Company, New York City.
International Agricultural Corp., New York City.
Smith-Rowland Co., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

NOZZLES—Spray
Monarch Mfg. Works, Inc., Philadelphia, Pa.

PACKING—For Acid Towers
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

PANS AND POTS
Stedman's Foundry and Mach. Works, Aurora, Ind.

PHOSPHATE MINING PLANTS
Chemical Construction Corp., New York City.

PHOSPHATE ROCK
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Charleston Mining Co., Inc., Richmond, Va.
Huber & Company, New York City.
International Agricultural Corp., New York City.
Jett, Joseph C., Norfolk, Va.
Ruhm, H. D., Mount Pleasant, Tenn.
Schmaltz, Jos. H., Chicago, Ill.
Southern Phosphate Corp., Baltimore, Md.
Taylor, Henry L., Wilmington, Del.
Wellmann, William E., Baltimore, Md.

PIPES—Chemical Stoneware
Chemical Construction Corp., New York City.

PIPES—Wooden
Stedman's Foundry and Mach. Works, Aurora, Ind.

PLANT CONSTRUCTION—Fertilizer and Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

POTASH SALTS—Dealers and Brokers
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Agricultural Corp., New York City.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Synthetic Nitrogen Products Co., New York City.
Taylor, Henry L., Wilmington, Del.
Wellmann, William E., Baltimore, Md.

POTASH SALTS—Manufacturers and Importers
American Potash and Chem. Corp., New York City.
Potash Co. of America, Baltimore, Md.
United States Potash Co., New York City.

PULLEYS AND HANGERS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

PUMPS—Acid-Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

PYRITES—Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Jett, Joseph C., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

QUARTZ
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

RINGS—Sulphuric Acid Tower
Chemical Construction Corp., New York City.

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SCALES—Including Automatic Bagging
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Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SCRAPERS—Drag
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

SCREENS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

SEPARATORS—Air
Sackett & Sons Co., The A. J., Baltimore, Md.
Sturtevant Mill Co., Boston, Mass.

SEPARATORS—Including Vibrating
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Sturtevant Mill Co., Boston, Mass.

SEPARATORS—Magnetic
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHAFTING
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHOVELS—Power
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corp., Chicago, Ill. and Cedar Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

SPRAYS—Acid Chambers
Monarch Mfg. Works, Inc., Philadelphia, Pa.

SPROCKET WHEELS (See Chains and Sprockets)

STACKS
Sackett & Sons Co., The A. J., Baltimore, Md.

SULPHATE OF AMMONIA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Company, The, New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Hydrocarbon Products Co., New York City.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Snythetic Nitrogen Products Co., New York City.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

SULPHUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Freeport Sulphur Co., New York City.
Texas Gulf Sulphur Co., New York City.

SULPHURIC ACID
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.

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Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Taylor, Henry L., Wilmington, N. C.
U. S. Phosphoric Products Corp., New York City.
Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Agricultural Corp., New York City.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, N. C.
U. S. Phosphoric Products Corp., New York City.
Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
International Agricultural Corp., New York City.
U. S. Phosphoric Products Corp., New York City.

SYPHONS—For Acid
Monarch Mfg. Works, Inc., Philadelphia, Pa.

TALLOW AND GREASE
American Agricultural Chemical Co., New York City.

TANKAGE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
International Agricultural Corp., New York City.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Smith-Rowland Co., Norfolk, Va.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

TANKAGE—Garbage
Huber & Company, New York City.

TANKS
Sackett & Sons Co., The A. J., Baltimore, Md.

TILE—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

TOWERS—Acid and Absorption
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

UNLOADERS—Car and Boat
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

UREA
Du Pont de Nemours & Co., E. I., Wilmington, Del.
Snythetic Nitrogen Products Co., New York City.

UREA-AMMONIA LIQUOR
Du Pont de Nemours & Co., E. I., Wilmington, Del.

VALVES—Acid-Resisting
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

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ZINC SULPHATE
Tennessee Corporation, Atlanta, Ga.

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